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Central Intelligence Agency



Washington, D.C. 20505

DIRECTORATE OF INTELLIGENCE

9 MAY 1983

MEMORANDUM FOR: Ambassador Richard Fairbanks
25X1 Office of the Special Middle East
Peace Negotiator
Department of State

FROM : [redacted]
Deputy Director of Global Issues

SUBJECT : West European Energy Requirements [redacted]

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1. Attached is a final version of our [redacted] study of European energy requirements. As you probably know, we provided a draft version in early April to Deputy Assistant Secretary Wendt, John Ferriter, and Bill Martin. [redacted] 25X1

2. If you have any questions or if we can be of further assistance, please feel free to contact me [redacted]

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Attachment:

Western Europe: Implications of Energy Import Dependence
GI M 83-10116, May 83 [redacted]

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Washington, D.C. 20505

DIRECTORATE OF INTELLIGENCE

9 MAY 1983

MEMORANDUM FOR: The Honorable Allan Wallis
25X1 Under Secretary for Economic Affairs
Department of State

FROM : [redacted] 25X1
Deputy Director of Global Issues

SUBJECT : West European Energy Requirements [redacted]
25X1

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Attachment:

Western Europe: Implications of Energy Import Dependence

GI M 83-10116, May 83 [redacted]

[redacted]

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[redacted]

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SUBJECT: Western Europe: Implications of Energy Import
Dependence

Distribution:

Orig - Ambassador Richard Fairbanks
Orig - The Honorable Allan Wallis
1 - SA/DDCI
1 - ExDir
1 - DDI
1 - NIO/Econ
1 - D/OGI
1 - Ch/SRD
3 - EIB
1 - Ch/PES
8 - OGI/PS

OGI/SRD/EIB:

(9 May 83)

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Washington, D. C. 20505

DIRECTORATE OF INTELLIGENCE

9 May 1983

Western Europe: Implications of Energy Import DependenceSummary

Our analysis of recent industry forecasts indicates that Western Europe will continue to rely on imports for 40 to 50 percent of total energy supplies through the end of the century. Imports will account for three-fourths of total oil demand throughout the period. One-third of 1990 gas needs are expected to be met by imports, and these could rise to as much as 50 percent of total requirements at the end of the century. As a result, Western Europe will remain vulnerable to energy supply disruptions especially if the energy market begins to tighten in the early 1990s as most of these forecasts project. Should oil prices continue to remain weak over the next few years or decline further, several gas projects might be postponed or delayed. Such developments would enhance the Soviet Union's ability to increase gas sales in the 1990s unless West European purchasers were willing to make a political commitment to subsidize high cost indigenous projects to encourage timely development of these supplies. [REDACTED]

Almost all forecasts argue that West European oil consumption will hold fairly steady or decline over the balance of the century. Oil's share of total energy is projected to decline as well. By the end of the century, however, oil is still expected to account for 35-45 percent of total West European energy needs. As a result, OECD West European countries will remain heavily dependent on the Persian Gulf as a source of oil supply. [REDACTED]

Despite the prospects for a soft energy market over the next few years, all recent forecasts expect substantial increases in West European gas use in every major country except the United Kingdom. Domestic production is expected to decline or remain flat at best, indicating that West European dependence on imports will rise substantially. By 1990, Western Europe is expected to

GI M 83-10116

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rely on the Soviet Union for 20 percent of total gas requirements with West Germany, France, and Italy relying on Moscow for 30 percent or more of their gas supplies. Unless steps are taken soon to increase indigenous gas production or contract for supplies from other non-OECD sources, Western Europe's dependence on Soviet gas could be even higher by the turn of the century.

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Continued weak demand has already forced a drop in oil prices and further declines are a distinct possibility. The improved competitiveness of oil resulting from a price decline would initially dampen non-oil energy demand, increase West European dependence on imported oil supplies, and lead to the delay or cancellation of several high cost projects aimed at increasing West Europe's indigenous energy production. Because of long lead times required to bring gas reserves on stream, no new North Sea gas supplies would be available if energy demand recovered in the early 1990s as most of these forecasts now expect. Such developments would enhance the Soviet Union's ability to capture a greater share of the West European gas market, given Moscow's hard currency needs and ability to step up deliveries in a relatively short period.

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The tightening market conditions forecast for the early 1990s will increase Western Europe's vulnerability to an energy supply disruption. Although the odds are against a major internal or external disruption in energy supplies in any particular exporting nation or region, the probability of some sort of disruption occurring is quite high. Since a large portion of oil and gas supplies will be imported from non-OECD sources, the risks associated with a disruption especially from the Middle East will remain high. While West European gas importers probably have enough flexibility to offset a simultaneous six month disruption in Soviet and Algerian gas supplies in 1990 through fuel switching, stock drawdowns, and surge production, some price pressures are likely to develop. A simultaneous cutoff of Middle East oil supplies and Soviet gas would entail extremely high economic and political costs for Western Europe.

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Because of their high import dependence, West European countries probably will remain reluctant to actively support certain US positions in negotiations with energy producers. Concern over energy security is also likely to cause several governments to intervene in the marketplace and impose artificial restraints such as export controls whenever a disruption or the threat of a loss of supplies occurs.

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In addition to measures already in place, West European countries have several other options available to them to help lessen the potential dangers of energy supply disruptions. If undertaken in the near term, West European countries would lessen the potential impact of supply disruption in the 1990s.

- o To the extent possible, diversify oil supplies away from the volatile Middle East region.*
- o Undertake a political commitment to guarantee development of indigenous gas reserves in the North Sea.*
- o Pay a premium to the Netherlands to extend gas contracts in the early 1990s in exchange for an equal volume of Norwegian gas later in the decade.*
- o European gas importers might also pay a premium to the Netherlands to maintain strategic gas reserves to be used in the event of a disruption.*

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*This memorandum was prepared by [redacted]
[redacted] Energy Issues Branch, Office of Global Issues.
The information contained herein is updated to 9 May 1983.
Comments may be directed to [redacted] Chief, Energy Issues
Branch, [redacted]*

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Western Europe: Implications of Energy Import DependenceCurrent Situation

Despite lower energy use and increased production of oil and nuclear power, Western Europe still relied on imported energy for more than 40 percent of energy requirements last year. Preliminary country data indicate that West European primary energy consumption fell to about 1205 million metric tons oil equivalent (mtoe)* in 1982, about 5 percent below year-earlier levels. Nuclear power output rose while use of other fuels held steady or declined. A four percent decline in oil consumption pushed its share of total energy down to less than 50 percent. Natural gas use also dropped--for the third consecutive year--to about 165 mtoe or some 10 percent below peak 1979 levels. [redacted]

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Based on OECD and individual country data, West Germany, France, Italy, and the United Kingdom account for about two-thirds of total West European energy demand. The United Kingdom, West Germany, the Netherlands, and Norway combined account for roughly 70 percent of total European energy production (Table 1).

- o Oil accounts for about half of total West European energy requirements, varying from 40 percent of total energy use in the United Kingdom to 67 percent in Italy.
- o Natural gas accounts for about 14 percent of European energy use. West Germany, the United Kingdom, and the Netherlands combined account for almost two-thirds of West European gas consumption. Domestic gas production, mostly from the United Kingdom, Norway, and the Netherlands, supplied Europe with almost 90 percent of gas requirements in 1980.
- o Coal consumption amounted to about 290 mtoe in 1980 or about 22 percent of overall energy use.
- o Nuclear and hydropower combined supply about 11 percent of energy requirements. [redacted]

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West European countries as a group relied on net imported energy--mostly oil--for about 13 million b/doe or about half of total energy requirements in 1980.

* Data converted at 1 billion cubic meters (bcm) = .82 mtoe and 1 mtoe = 7.3 barrels oil equivalent and 1 billion cubic meters (bcm) = 16,4000 b/doe.

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Table 1

Western Europe: Energy Requirements, 1980^{1/}

	Western Europe	West Germany	France	Italy	United Kingdom	Nether- lands	Norwa mtoe
Energy Consumption	1273.5	275.1	202.3	146.3	204.0	75.0	24.3
Energy Production	648.8	124.0	54.4	25.4	198.2	72.7	61.4
Energy Imports	936.9	185.0	166.7	132.9	70.8	88.6	8.9
Net Imports(Exp)	647.2	155.5	151.8	120.7	12.3	3.1	(36.7)
Oil Consumption	673.0	138.0	115.8	98.4	83.0	39.8	9.8
Domestic Prod	122.0	4.7	2.4	1.8	81.0	1.6	24.5
Imports	607.3	140.7	127.3	108.3	57.2	80.0	8.0
Persian Gulf	345.7	41.3	78.5	47.1	33.8	33.5	1.1
Other OPEC	131.7	36.7	21.2	26.7	2.6	13.9	0.8
Total OPEC	477.4	78.0	99.6	73.8	36.4	47.4	1.8
USSR	56.5	7.4	8.4	6.9	1.2	6.8	0.2
Other Non-OECD	59.3	94.4	6.6	22.3	7.3	7.2	0.8
OECD	6.8	43.4	12.8	5.1	12.3	18.6	5.2
Exports	45.7	7.4	13.9	11.8	55.5	41.8	22.7
Net Imports (Exp)	561.2	133.3	113.4	96.5	1.8	38.2	(14.7)
Natural Gas							
Consumption	179.0	43.3	22.8	22.5	41.1	31.0	0.9
Domestic production	159.5	14.6	6.3	10.5	31.9	70.2	23.7
Imports	26.0	37.8	17.4	11.7	8.2	3.3	0.
Algeria	3.9	0.	1.8	0.	0.	0.	0.
Libya	0.	0.	0.	0.	0.	0.	0.
USSR	21.0	8.9	3.3	5.7	0.	0.	0.
Other Non-OECD	1.1	0.	0.	0.6	0.	0.	0.
OECD (of which)		28.9	12.3	5.4	8.1	3.3	0.
Netherlands		20.3	9.6	5.4	0.	0.	0.
Norway		8.6	1.9	0.	8.1	3.3	0.
Total Exports	0.	7.5	0.2	0.	0.	42.1	26.9
Net Imports (Exp)	26.0	30.3	17.2	11.7	8.2	(38.8)	(26.9)
Coal Consumption	279.9	83.9	36.5	13.4	76.2	4.1	1.4
Domestic production	225.8	90.3	14.6	1.3	74.9	0.	0.6
Imports (of which)	62.1	8.1	22.8	12.6	4.3	5.6	0.9
South Africa	13.2	1.0	6.2	2.3	negl	0.2	0.
Poland	12.4	1.3	2.3	1.5	0.3	0.7	0.
USSR	3.0	0.2	0.5	0.7	negl	0.	0.
Other Non-OECD	3.8	2.0	7.9	3.8	0.6	1.6	0.
OECD (of which)	29.7	3.6	10.7	6.7	3.4	3.4	0.3
U.S.	23.1	1.5	5.0	4.2	2.0	1.8	0.
Australia	6.0	0.5	1.1	0.8	1.4	0.7	0.
Exports		14.5	0.9	0.5	3.0	1.6	0.1
Net Imports (Exp)	62.1	(6.5)	21.9	12.1	1.3	4.1	0.8
Hydro	91.1	4.3	16.6	11.3	1.3	0.	12.6
Nuclear	50.5	10.1	14.4	0.5	9.0	0.9	0.

¹ Most recent year for which complete data was available.

- o Net oil imports of about 560 mtoe amounted to 80 percent of oil requirements and about 45 percent of energy consumption. Reliance on supplies from the Persian Gulf region alone amounted to about 345 mtoe or more than 50 percent of oil imports (Figure 1).
- o Natural gas imports from the USSR and Algeria accounted for about 12 percent of European gas use in 1980 (Figure 2).
- o Coal imports in 1980 amounted to about 62 mtoe or 20 percent of consumption. About half of coal imports come from OECD countries (Figure 3).

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Reliance on imported energy among individual West European countries varied widely. Italy, France, and West Germany imported 83, 74, and 55 percent of total energy requirements in 1980, respectively. At the other extreme, the United Kingdom, the Netherlands, and Norway remained almost self-sufficient in net energy trade.

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Sectoral Demand

The industrial and residential/commercial sectors each accounted for about one-fourth of total energy demand in Western Europe according to OECD data. Oil and natural gas combined supply 55 percent of industrial energy needs and about two-thirds of requirements in the residential and commercial sector¹ (Figure 4). The transportation sector consumed mostly oil and accounted for about 16 percent of total energy use. Fuel used in generating electricity accounted for the remaining 30 percent of European energy consumption with coal and hydropower accounting for almost two-thirds of fuel inputs. Oil and natural gas combined supplied only about 25 percent of power plant consumption (Figure 5).

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Energy Market Outlook

The success of long term forecasts in predicting outcomes in the world energy market has been minimal. Because of uncertainties regarding economic performance, price trends, and consumer response to higher prices, most forecasts have substantially overestimated energy demand in recent years and understated the energy savings from conservation and technological change. Recent long term forecasts remain vulnerable to the shortcomings of past projections because most of the results are based on assumptions about highly uncertain variables such as economic growth, energy prices, and the degree of response of supply and demand to changes in prices.

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¹ Excluding electricity generated by oil and gas.

Figure 1

WESTERN EUROPE: OIL IMPORTS BY SOURCE, 1980

Percent of Total

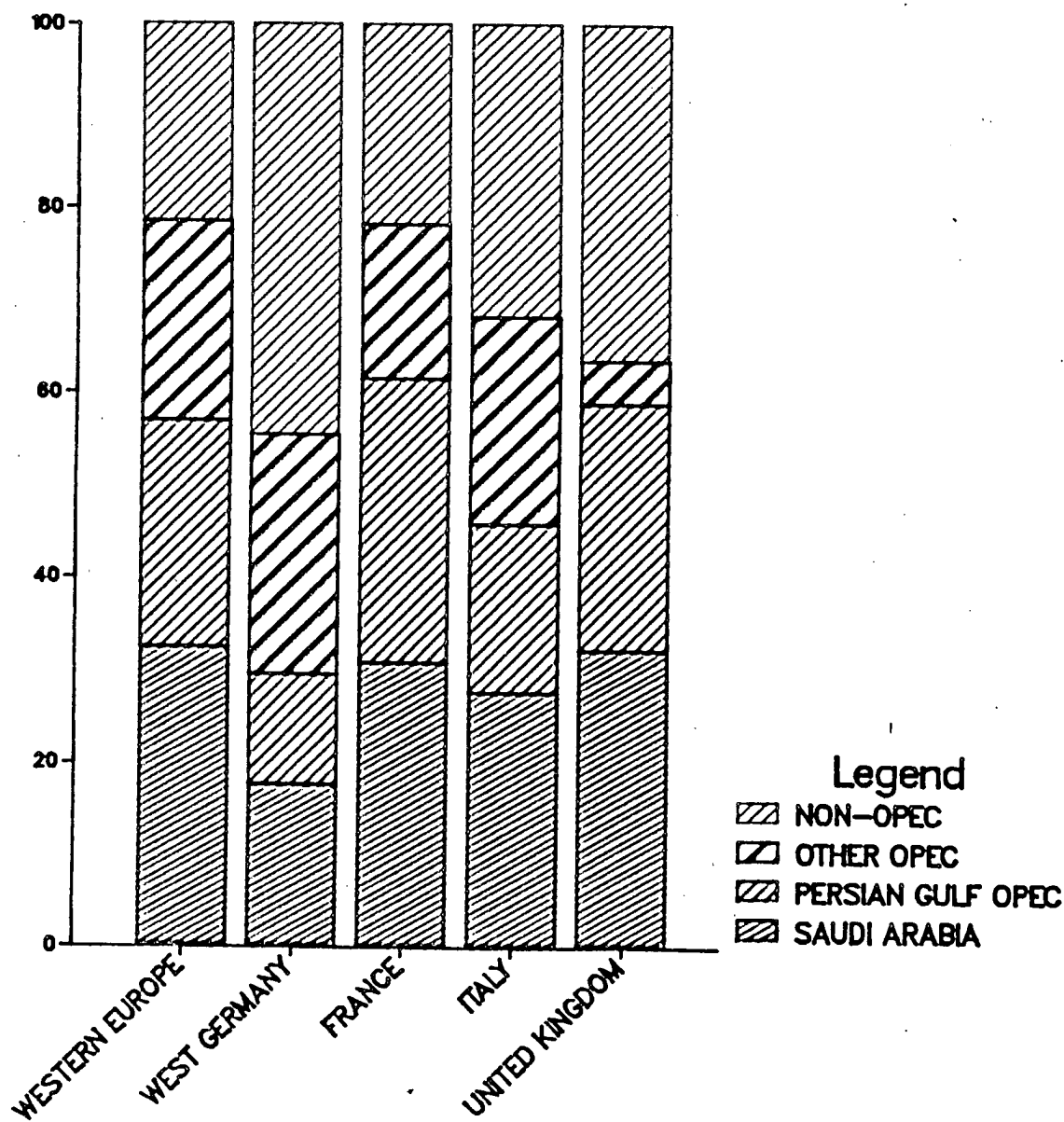
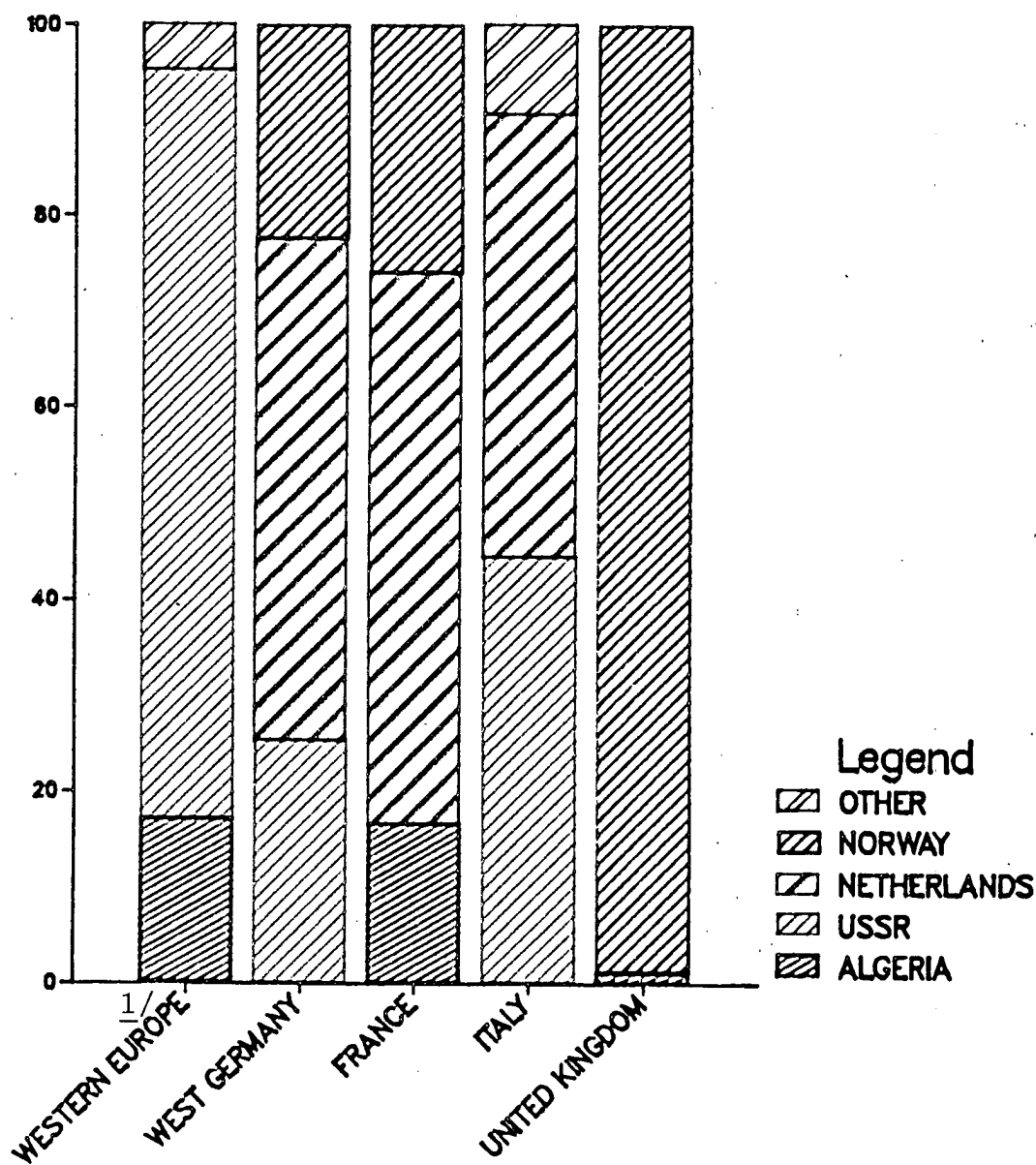


Figure 2

WESTERN EUROPE: NATURAL GAS IMPORTS BY SOURCE, 1980

Percent of Total



¹ Excludes intra European Trade.

Figure 3

WESTERN EUROPE: COAL IMPORTS BY SOURCE, 1980

Percent of Total

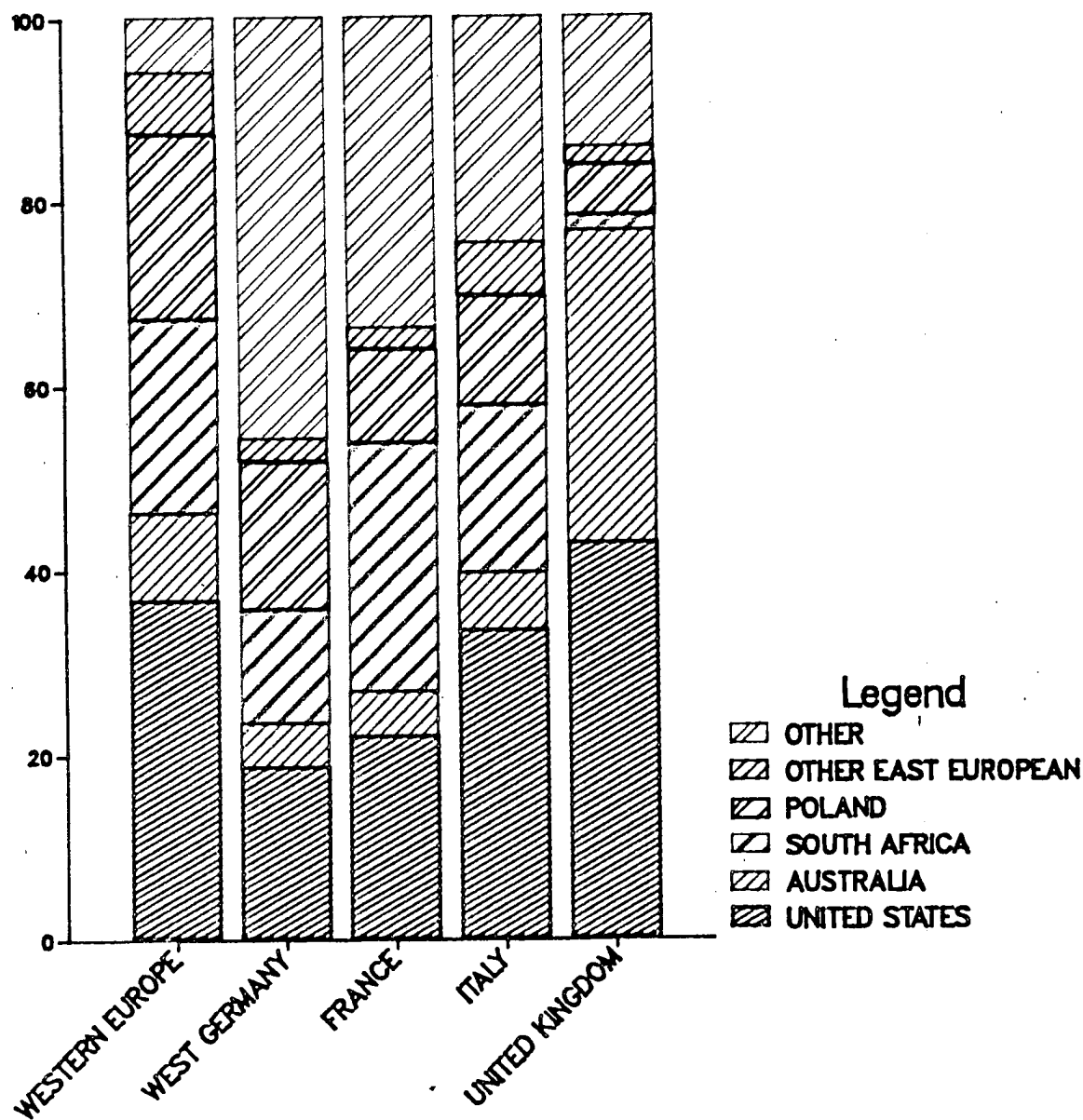


Figure 4

WESTERN EUROPE: ENERGY CONSUMPTION BY SECTOR, 1980

Percent

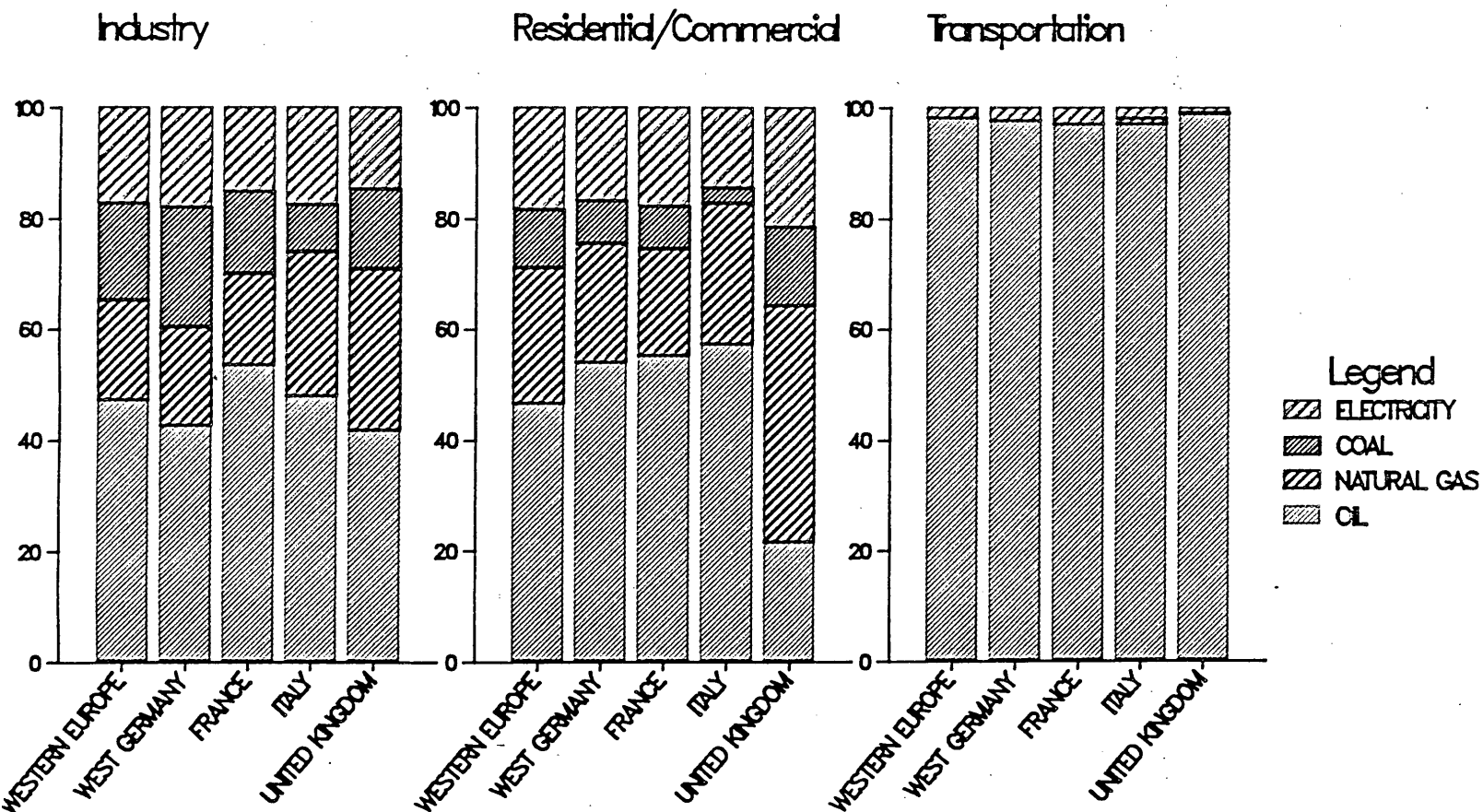
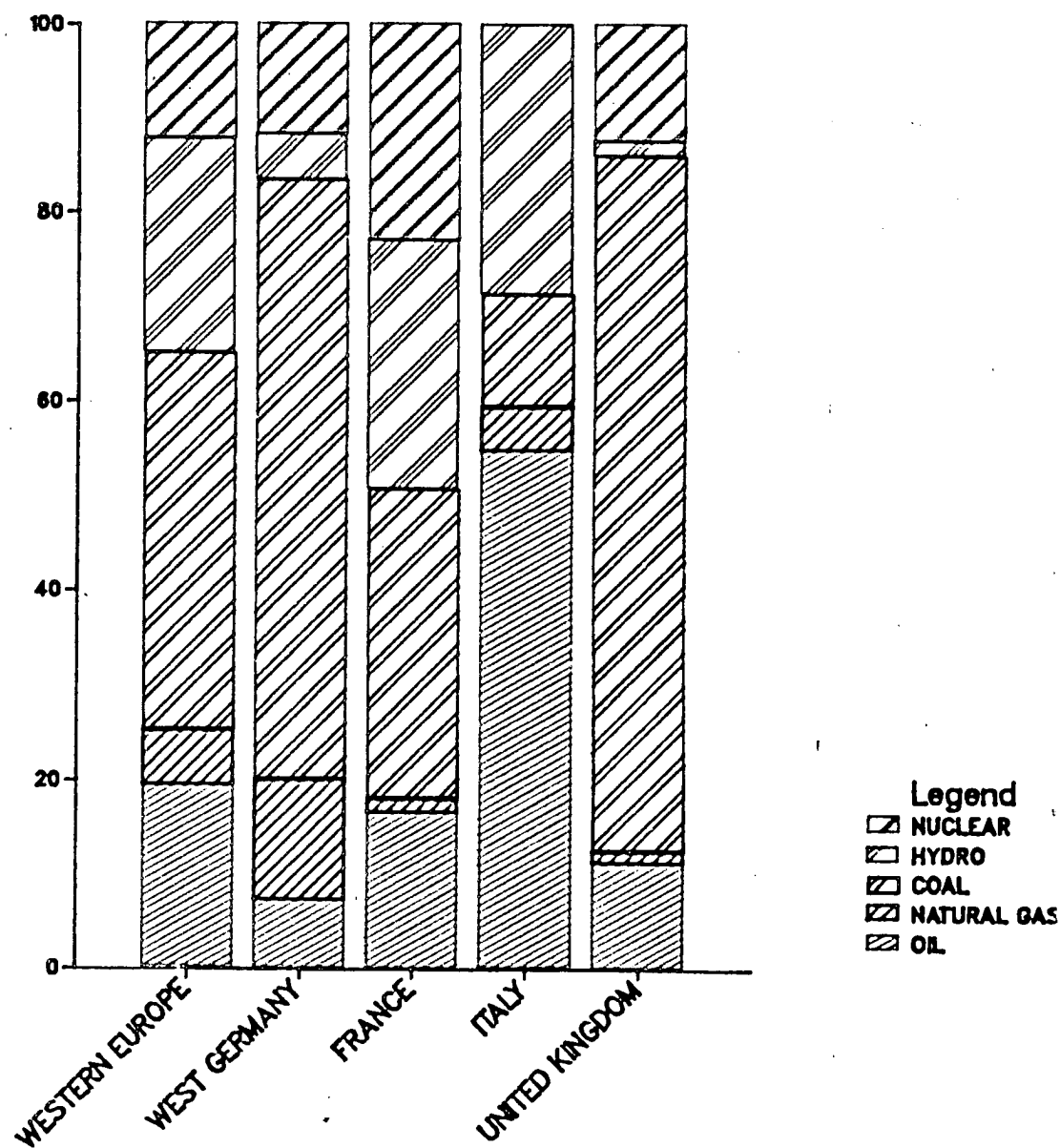
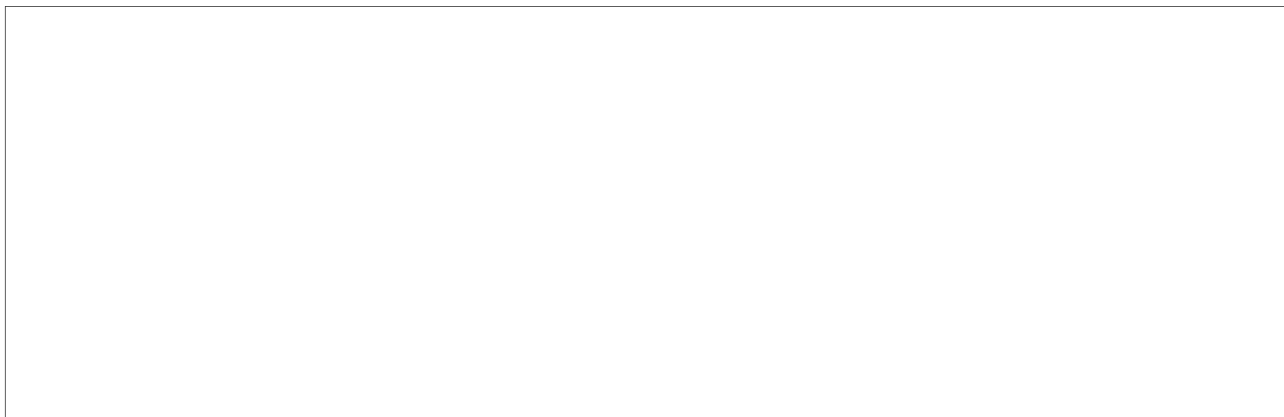


Figure 5


WESTERN EUROPE: ELECTRICITY GENERATION, 1980


Percent







Key Assumptions

Long term energy market projections are sensitive to critical assumptions about economic growth and prices. Even small changes in either variable over the period can cause substantial changes in projected energy requirements. We have examined the key assumptions and, in our view, they appear reasonable. Key assumptions from the available projections we examined are: 

Prices. Most of the energy supply/demand projections assume declining real oil prices to 1985, flat real prices from 1985-1990 and real price increases of 1.5-3 percent per year through 2000. While most forecasters agree on the general trend of crude oil prices, they point out that the price path may not be a smooth one. Forecasters believe that oil prices are more likely to rise as a result of a supply disruption rather than continued growth in oil consumption. 

The continuing soft oil market has led many forecasters to scale back price assumptions from year earlier levels. Last year, for example, the consensus forecast of the 1990 benchmark oil price ranged from \$34-40 per barrel in constant 1981 dollars. In current projections, the benchmark OPEC oil price is expected to range from \$24-29 per barrel in 1985 (1981 dollars) and from \$26-31 per barrel in constant 1981 dollars for 1990. Price assumptions for 2000 vary from \$31-40 per barrel in constant 1981 dollars. 

Assumptions about other energy prices are generally less precise. Indeed, most forecasts do not explicitly treat the potential for interfuel substitution, citing only assumptions about relative price levels and in some cases indicating where potential supply constraints may exist. In general, prices of other fuels are expected to move in line with oil prices. 

Growth. The forecasts assume average annual real economic growth of 1.8-2.5 percent during the 1980s for Western Europe. Given economic performance since 1980 and expectations for 1983, GNP in Western Europe would have to average about 3 percent annually through 1990 to achieve a 2.1 percent annual growth rate

for the decade as a whole. Forecasts point to an average annual growth rate of 2.4-2.8 percent during the 1990s. Year to year variations in growth due to the effects of the business cycle are not accounted for in these forecasts. Variability above and below the average growth for the period can account for sizable swings in energy consumption. [REDACTED]

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Demand Forecasts

Recent forecasts continue to reflect downward revisions of energy requirements, indicating only moderate demand growth in Western Europe through the end of the century. The decline in energy consumption in recent years is expected to bottom out this year and West European energy consumption is projected to rise at an average annual rate of 1-1.6 percent during this decade to 1387-1427 mtoe by 1990 (Summary Tables). During the remainder of the century, forecasts call for European energy consumption to grow at an average annual rate of 1.7 to 2.5 percent with total energy consumption for 2000 ranging from 1540 to 1712 mtoe. Most of the increase in West European energy demand through the end of the century is expected to be met by non-oil fuels. [REDACTED]

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Oil. Oil consumption in Western Europe is expected to hold fairly steady or decline through 1990. Forecasts of West European oil consumption in 1990 range from 533 to 640 mtoe. Although oil's share of total energy is projected to decline during the decade, oil will continue to account for about 40-45 percent of total energy requirements by 1990. West European oil use in 2000 is projected to range from 421-670 mtoe, still some 35-45 percent of energy requirements. [REDACTED]

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Increased oil use in the transportation sector is expected to be offset by lower oil use in most other sectors. Oil use in the electricity generation sector is expected to fall from more than 78 mtoe in 1980 to less than 50 mtoe by 2000. Despite a projected decline in oil use, the residential/commercial and industrial sectors still will rely on oil for about 25 percent and 15 percent respectively of energy requirements by 2000. [REDACTED]

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Forecasters expect West European oil production to range from 118-144 mtoe in 2000 compared to actual production of 122 mtoe in 1980. During the period, UK oil production is expected to peak at 125 mtoe in 1985 before declining to 68-105 mtoe in 1990 and 77-85 mtoe in 2000. [REDACTED]

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Natural Gas. Given the soft oil market outlook and an expected escalation in the price of gas relative to other fuels, most government and industry analysts have revised downward long term projections of West European gas consumption. Forecasts now project the region's gas demand to rise from 179 mtoe in 1980 to about 196-227 mtoe in 1990. Natural gas use is expected to continue to grow during the 1990s and range between 230-255 mtoe by 2000. All major countries except the United Kingdom are expected to register substantial increases in gas use. West

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mtoe

West Germany

	<u>1980</u>	<u>1990</u> range	<u>2000</u> range
Energy consumption	275	268-300	286-338
Net imports	156	152-158	
Oil consumption	133	98-128	95-133
Oil production	5	4-5	
Net imports	133	94-123	
Natural gas consumption	43	42-55	46-54
Natural gas production	15	10-15	
Net imports	30	32-41	
Coal consumption	84	85-105	102
Coal production	90	90-92	
Net imports (exports)	(6)	4-15	
Hydro-Nuclear	14	25-37	41-50

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mtoe

France

	<u>1980</u>	<u>1990</u> range	<u>2000</u> range
Energy consumption	202	220-246	241-281
Net imports	152		
Oil consumption	113	87-111	91-121
Oil production	2	2	
Net imports	113	85-98	
Natural gas consumption	22	24-35	27-40
Natural gas production	6	3-4	
Net imports	17	20-28	
Coal consumption	36	16-39	24-43
Coal production	15	11-16	
Net imports	22	5-23	
Hydro-Nuclear	31	63-88	73-121

		<u>Italy</u>	mtoe
	<u>1980</u>	<u>1990</u> <u>range</u>	<u>2000</u> <u>range</u>
Energy consumption	146	159-182	183-256
Net imports	121	134-154	
Oil consumption	98	76-101	78-114
Oil production	2	2	
Net imports	96	74-99	
Natural gas consumption	23	30-34	38-42
Natural gas production	10	6-10	
Net imports	12	20-26	
Coal consumption	13	23-36	38-71
Coal production	1	1	
Net imports	12	34-35	
Hydro-Nuclear	12	16-19	26-29

mtoe

United Kingdom

	<u>1980</u>	<u>1990</u> range	<u>2000</u> range
Energy consumption	204	204-221	214-251
Net imports (exports)	12	(7)-(23)	
Oil consumption	83	70-80	65-84
Oil production	81	68-105	
Net imports (exports)	(2)	(18)-(25)	
Natural gas consumption	41	44-48	45-54
Natural gas production	32	37-40	
Net imports	8	4-9	
Coal consumption	70	68-85	73-87
Coal production	75	77-84	
Net imports (exports)	1	1-(3)	
Hydro-Nuclear	10	14-20	15-30

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Germany, Italy, and France combined are expected to account for over half of all West European gas consumption in both 1990 and 2000. []

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Most of the growth in West European gas demand probably will occur in residential/commercial sector. One major firm expects this sector to account for half of European gas demand in 1990 and 2000 while the West German gas association forecasts that the number of households hooked up to gas will rise from 5.4 million in 1980 to 9 million by 1990. DRI projects the share of gas in the residential/commercial sector will rise from about one-fourth to about one-third by 2000 and that oil and gas combined will supply about two-thirds of energy requirements in this sector. The ability of gas to penetrate the industrial sector will be limited, however, by price competition with residual fuel oil. Power plant usage of natural gas is expected to continue to fall in absolute terms as higher gas prices relative to competing fuels--particularly nuclear and coal--make it difficult for power companies to expand gas use. []

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West European gas production is expected to approximate 143-165 mtoe by 1990, and to range from 123-165 mtoe by 2000. Dutch output is expected to fall from 70 mtoe in 1980 to about 50 mtoe in 1990 and 25 mtoe in 2000. These lower production estimates reflect current Dutch policy to ban new gas export contracts. It is possible, however, that the recent slump in domestic gas sales, and future government revenue requirements could lead to some relaxation of the ban on new export sales. Norway, with its huge North Sea reserves, will have the ability to increase gas production sharply in the 1990s. Recent projections put Norwegian production as high as 32 mtoe in 1990 and 43 mtoe in 2000. These estimates assume, however, that continental buyers will be willing to pay some premium for Norwegian gas in order to diversify their sources of supply. []

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Coal. Forecasts of West European coal consumption in 1990 range from 298-389 mtoe. Projections for coal use in 2000 range from 355-566 mtoe. []

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Nuclear and Hydro. Nuclear and hydro production combined are expected to double during this decade to 264-297 mtoe. Based on expectations of expanded nuclear plant construction, consumption of these fuel sources is expected to reach 330-396 mtoe by 2000. []

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Implications for Energy Trade

Despite substantial progress in reducing energy needs through conservation and substitution since early 1970s, industry projections point to continued high Western European dependence on imported energy supplies, especially oil and natural gas, through the end of the century. During the period, most forecasts expect Western Europe to depend on imported energy for 40-50 percent of total energy requirements. Reliance on imported

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energy in individual West European countries will vary widely. The United Kingdom, Norway, and the Netherlands will basically remain self-sufficient in net energy trade. In contrast, dependence on imported energy in West Germany and France is expected to approximate 50-60 percent and reliance on imports in Italy is projected to exceed 80 percent through 2000. []

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Oil

West European reliance on imported oil is expected to fall to 402-490 mtoe in 1990 and 300-553 mtoe by 2000. Based on the mid range estimate, imported oil as a percent of energy requirements will fall to roughly 30 percent in 1990 and about 25 percent in 2000. The major West European countries will remain heavily dependent on imported oil.

- o France is expected to depend on imported oil for 34-45 percent of total energy requirements through the end of the century.
- o West German dependence is expected to trend downward but remain at about 30-40 percent of total energy.
- o Net oil imports as a share of total energy in Italy is expected to range from roughly 50-60 percent in 1990 and 35-40 percent in 2000. []

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Future oil import patterns are difficult to predict. Flows will depend in part on political developments and contractual arrangements. Although no estimates are available for sources of imports for 1990 and beyond, most forecasters indicate that OPEC will retain its position as the principal supplier of internationally traded oil. Most long term forecasts indicate demand for OPEC oil will approximate 25-30 million b/d or roughly half of Free World oil supplies between 1990-2000. Because Persian Gulf OPEC countries account for nearly 60 percent of Free World oil reserves, Western Europe's reliance on this region will remain substantial. []

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Natural Gas

Recent forecasts project West European gas import needs as low as 40 mtoe and as high as 77 mtoe in 1990. Based on the midpoint estimate of natural gas consumption and indigenous production in these forecasts, we estimate the region's natural gas import demand will approximate 71 mtoe in 1990 or about one-third of anticipated total gas requirements (Tables 3-8).

- o The USSR is expected to supply about 40-45 mtoe or about 20 percent of total gas requirements. France, West Germany, and Italy will be the major importers of Soviet gas. France and Germany have already signed contracts for additional supplies of gas from the USSR which could push dependence on Soviet gas above 30

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Table 3

West Europe Natural Gas Supply and Demand^a
mtoe

	<u>1980^b</u>	<u>1990</u> <u>mid range</u> <u>estimate</u>	<u>2000</u> <u>mid range</u> <u>estimate</u>
Demand	179	212	244
Production	159	141	110
of which Netherlands ^c	70	47	26
Norway ^c	24	24	14
United Kingdom	32	39	40
other Europe	34	31	29
Import Demand	26	71	134
Non OECD Contracted Supplies	26	63 to 71	64 to 71
Soviet ^d		40 to 45	40 to 45
existing	21		
Urengoi		21	21
minimum		19	19
maximum		24	24
Libya		3	3
Algeria ^e			
minimum	4	20	20
maximum		23	23
Other	1		
Supply Gap		0 to 8	63 to 70
potential supplies			
Algeria			23 to 29
Norway ^f		3	53
Netherlands		16	14
LNG			19
USSR ^g		8 to 12	8 to 12

- a. Numbers may not add to totals shown due to conversion and rounding.
- b. 1980 data is actual trade. Discrepancy between supply versus consumption is stocks and losses in transformation.
- c. Export contracts plus domestic consumption. Netherlands consumption assumed at 30 mtoe in 1990 and 20 mtoe in 2000.
- d. Soviet contract estimates include Italy.
- e. Algerian contract estimates do not include Spain, as contracts are being renegotiated.
- f. Norway potential includes Sleipner; Troll and several other small fields.
- g. USSR supply potential is for existing export capacity only.
- Note: 1 bcm = .82 mtoe.

Table 4

West Germany Natural Gas Supply and Demand^a

mtoe

	<u>1980^b</u>	<u>1990</u> <u>mid range</u> <u>estimate</u>	<u>2000</u> <u>mid range</u> <u>estimate</u>
Demand	48	49	50
Production	15	14	12
Import Demand	38	35	8
Contracted Supplies	38	37 to 39	25 to 27
Soviet	9	17 to 19	17 to 19
existing	9	10	10
Urengoi			
minimum		7	7
maximum		9	9
Libya			
Algeria			
minimum			
maximum			
Netherlands	20	12	
Norway	9	8	8
Supply Shortfall (Surplus)		(2 to 4)	11 to 13

a. Numbers may not add to totals shown due to rounding.

b. Actual trade.

Note: 1 bcm = .82 mtoe.

Table 5

France Natural Gas Supply and Demand^a

mtoe

	<u>1980^b</u>	<u>1990</u> <u>mid range</u> <u>estimate</u>	<u>2000</u> <u>mid range</u> <u>estimate</u>
Demand	23	30	32
Production	6	4	3
Import Demand	17	26	29
Contracted Supplies	17	19 to 21	19 to 21
Soviet		8 to 10	8 to 10
existing	3	3	3
Urengoi			
minimum		5	5
maximum		7	7
Libya			
Algeria	3	8	8
minimum			
maximum			
Netherlands	10		
Norway	2	3	3
Supply Shortfall (surplus)		5 to 7	8 to 10

a. Numbers may not add to totals due to rounding.

b. Actual trade.

Note: 1 bcm = .82 mtoe.

Table 6

Italy Natural Gas Supply Demand^a

mtoe

	<u>1980^b</u>	<u>1990</u> <u>mid range</u> <u>estimate</u>	<u>2000</u> <u>mid range</u> <u>estimate</u>
Demand	22	32	40
Production	10	6	6
Import Demand	12	26	34
Contracted Supplies	13	28 to 30	23 to 25
Soviet		11 to 13	11 to 13
existing	6	6	6
Urengoi			
minimum		5	5
maximum		7	7
Libya	1	2	2
Algeria		10	10
minimum			
maximum			
Netherlands	6	5	
Norway			
Supply Shortfall (Surplus)		(2 to 4)	9 to 11

a. Numbers may not add to totals shown due to rounding.

b. Actual trade.

Note: 1 bcm = .82 mtoe.

Table 7

United Kingdom Natural Gas Supply and Demand^a

mtoe

	<u>1980^b</u>	<u>1990</u> <u>mid range</u> <u>estimate</u>	<u>2000</u> <u>mid range</u> <u>estimate</u>
Demand	41	45	48
Production	32	39	42
Import Demand	9	6	6
Contracted Supplies	9	10	
Norway	8	10	
Algeria	1		
Supply Shortfall (Surplus)		(4)	6

a. Numbers may not add to totals shown due to rounding.

b. Actual trade.

Note: 1 bcm = .82 mtoe.

Table 8

Belgium Natural Gas Supply and Demand^a

mtoe

	<u>1980^b</u>	<u>1990</u> <u>mid range</u> <u>estimate</u>	<u>2000</u> <u>mid range</u> <u>estimate</u>
Demand	9	10	11
Production			
Import Demand	9	10	11
Contracted Supplies	10	4 to 6	4 to 6
Soviet			
existing			
Urengoi			
minimum			
maximum			
Netherlands	8		
Norway	2	2	2
Algeria			
minimum		2	2
maximum		4	4
Supply Shortfall (Surplus)		4 to 6	5 to 7

a. Numbers may not add to totals shown due to rounding.

b. Actual trade.

Note: 1 bcm = .82 mtoe.

25X1

percent of requirements. Italy is also expected to contract for an additional 5-6.5 mtoe bringing Italian reliance on Soviet gas to about 36 percent by 1990.

- o Based on current contracts, Algeria is expected to supply Europe with 20-23 mtoe of natural gas in 1990-- about 10 percent of total requirements. Most of this gas will go to France and Italy.
- o Libya is expected to export about 3 mtoe of liquefied natural gas (LNG) to Italy and Spain in 1990.

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While we believe contracted supplies should be ample to meet projected demand in Western Europe through 1990, the situation varies across individual countries.

- o Italy probably will cover import needs through 1990 if they sign to take additional Soviet gas.
- o France has supply contracts to cover 80 percent of gas import requirements but will need to get an additional 6 mtoe to meet projected demand. Paris may be able to rely on Dutch contract flexibility to meet at least part of this shortfall.
- o Based on current estimates of gas demand in 1990, West Germany could have surplus gas supplies of 1 to 2 mtoe. German utilities probably will eliminate this surplus by exercising their option to reduce purchases of Siberian gas by 20 percent. A decision by the utilities on this matter has been deferred until October 1983.
- o Belgium has firm supply contracts for about half of expected requirements and is seeking additional Dutch gas to meet part of the projected 4-6 mtoe shortfall by 1990.

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France, Belgium, and Italy could realize a shortfall in contracted supplies from Algeria because of production problems in Algeria's largest gas field. We estimate that on average Algeria will meet only about one-half of its annual gas export commitments in the late 1980s and early 1990s. If demand materializes as expected, such a shortfall probably would encourage additional European purchases of Soviet gas late in the decade or force higher levels of domestic production.

1990s

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If the mid-range demand estimate of 244 million mtoe in 2000 proves accurate, we believe Western Europe will need to contract for additional gas supplies for the 1990s. Based on existing contracts and estimates of indigenous production, total gas availability in Western Europe will approximate 174-181 mtoe:

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- o The USSR will supply 40 to 45 mtoe of gas to Europe through 2000.
- o Algeria will export 21-23 mtoe of natural gas annually to Europe through the end of the century.
- o Libya is committed to export about 3 mtoe to Western Europe to 2000.
- o Norway has contracted to supply about 14 mtoe of natural gas to Germany, France, Belgium, and the Netherlands to 2000.
- o The Netherlands export contracts expire before 1995; the Dutch are expected to produce only 26 mtoe in 2000 to meet domestic requirements.
- o Other West European production--mainly from the United Kingdom--is expected to approximate 71 mtoe.

Given demand estimates from recent forecasts, Western Europe will need to contract for an additional 63-70 mtoe for the 1990s to balance gas needs. Unless gas demand is sharply below anticipated levels and/or future gas export availability from North Sea producers is higher than currently projected, West European countries will have a difficult time holding dependence on a single supplier to no more than 30 percent of requirements as recommended recently by the IEA. []

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Potential Suppliers

Several gas producers are in an excellent position to supply any incremental gas to the West European market in the 1990s because of their substantial gas reserves. Norway, Canada, Iran, Nigeria, Algeria, and the Soviet Union have all viewed the European market as a potential outlet for new gas sales. Except for Moscow and Algiers, however, decisions must be taken soon to ensure deliveries by the early 1990s. []

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Norway

The Norwegian Government, which has traditionally pursued a go-slow attitude toward offshore petroleum development, has recently underscored its willingness to make substantial volumes of gas available to Western Europe in the 1990s. Norway has two major natural gas fields available for development in the 1990s, the Sleipner field and the Troll field, and sufficient gas reserves to support expanded production after 2000. Sleipner and Troll combined contain natural gas reserves of over 1,640 mtoe. Sleipner could potentially produce 16 mtoe per year by 1995 and production from Troll could approximate 33 mtoe by 2000. Gas from neither of these fields is currently contracted for, however, and new large North Sea projects of this type are likely

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to be quite costly compared to supplies available from other sources. [REDACTED]

[REDACTED]

Further complicating examination of potential Norwegian gas supplies available to Western Europe is the fact that the continental and UK gas markets are physically separate and compete for Norwegian gas. Although a decision has not yet been made, there is a good possibility that Sleipner gas will be landed in the UK, leaving only Troll gas as an additional Norwegian source available to the continent in this century. State Department reporting indicates that the current thinking in Oslo is to move forward quickly with negotiations for the sale of Troll gas--probably in 1984--without waiting for completion of exploratory drilling on neighboring blocks. [REDACTED]

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Algeria. Despite near-term problems with gas production and exports, we believe declining oil and natural gas liquids production in the 1990s will force Algeria to seek expanded markets for natural gas.¹ Although committed to exports of only about 23 mtoe in 2000, Algeria's gas reserves could permit an additional 23 to 29 mtoe of natural gas exports by the end of the century. Any expansion in gas exports will require sizeable investments in numerous new production wells and gas pipelines. [REDACTED]

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Libya and Other Potential LNG Suppliers. Although committed to supply about 3 mtoe of gas to Western Europe through 2000, Libya could potentially export an additional 9 mtoe by either increasing LNG export facilities or constructing a pipeline to Europe. As much as 10 mtoe of LNG could also be available from a variety of other suppliers including Cameroon, Nigeria, Qatar, and possibly Canada. Most of these projects are still being studied, however, and we believe prospects for several of these projects appear increasingly doubtful because of the weak energy market. [REDACTED]

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The Soviet Union. Vast natural gas reserves in West Siberia indicate that total potential natural gas supplies from the USSR to Western Europe are probably limited only by European demand

[REDACTED]

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for Soviet gas. By minimizing hard currency outlays and accepting relatively low returns on domestic resources, the Soviet Union is capable of delivering gas to Western Europe at prices which are competitive with all other fuels. Moreover, to ensure hard currency earnings, we believe the Soviets will continue to price their gas at or below prices offered by competing suppliers. The apparent readiness of the USSR to agree to more flexible delivery patterns also enhances the competitive strength of Soviet gas in the European market. Because of surplus capacity in the existing export pipeline system, the Soviet Union already has the capability of delivering at least 8-12 mtoe of additional gas to Western Europe and continues to seek new markets for gas. []

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The Netherlands, currently Europe's largest gas supplier, is the most reliable and economical source of additional gas. Under current government policies designed to conserve gas resources, Dutch gas for exports will dwindle to zero by 2000. Contract flexibility and Dutch revenue needs could alter this situation.

- o Gas deliveries under existing contracts--due to be phased out in the early 1990s--can probably be stretched through at least the mid-1990s by deferring gas deliveries from earlier years when available supplies exceed demand. Both France and Italy, for example, have recently cutback Dutch imports to conserve these reserves for strategic purposes.

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- o Given the size of Dutch gas reserves--about 1,722 mtoe--and the budgetary pressures confronting the Hague, a new gas policy is being formulated, and we believe new export contracts might be authorized. [] however, any additional exports will probably be at a premium price. []

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In absence of a change in current government export policy, the Netherlands could still act as a potential offset in the event of a supply disruption. We believe the Dutch, however, would likely demand compensation to hold strategic reserves for other countries. []

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Coal. Rising consumption combined with fairly flat domestic production is expected to increase to West European dependence on imported coal to 200-300 mtoe by 2000--about 15 percent of total energy requirements. Coal trade within the region is expected to decline gradually with the bulk of the increase in imports projected to come from other OECD countries, primarily the United States and Australia. Other sources of supply will likely be South Africa and new coal exporting countries like Colombia. West European imports of coal from Poland and the Soviet Union could increase by a small amount. []

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Impact of Lower Oil Prices

Continued weak demand has already forced a drop in oil prices and a further decline remains a distinct possibility. Should this occur, future energy supply and demand patterns could be considerably different from current projections. The improved competitiveness of oil initially would dampen non-oil energy demand relative to oil, and increase West European dependence on imported oil supplies. []

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Even if lower energy prices eventually resulted in greater economic growth and increased energy consumption as expected, they would also reduce the amount of new energy projected to come from high cost indigenous production. In particular, lower oil prices could lead to the delay of major new North Sea projects such as the Norwegian Troll field because low returns would make these large capital investment projects highly uneconomic. At crude oil prices of \$25 per barrel and below, for example, residual fuel oil prices would approximate \$3.60 per million Btu or less while new gas deliveries from Norway would cost about \$5 per million Btu. Investments in some high cost North Sea oil projects would be similarly affected. []

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[] we estimate that a fall in the price of crude oil to \$25 per barrel--15 percent below our base case--would lead to an increase in energy demand of 50 mtoe in Western Europe by 1990. Because nearly all the increase is in the demand for oil, gas demand remains virtually unchanged. Unless gas producers were confident of a substantial rebound in energy prices or gas development projects were subsidized, Norwegian and other projects probably would be postponed. []

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Because of the long lead times required to bring gas reserves on stream, no new North Sea gas supplies would then be available if energy demand recovered in the early 1990s. Such developments would enhance the Soviet Union's ability to capture a greater share of the West European gas market, given the Soviets' surplus capacity in existing pipelines and considerable flexibility in directing gas from domestic pipelines. We believe Moscow's need for hard currency earnings would ensure that its gas would be priced competitively with other fuels to guarantee access to the European market. When market conditions did tighten again, however, the Soviets could then be expected to raise prices to maximize revenues. []

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Policies to Increase Energy Security

Since 1973, West European governments have recognized the need to reduce reliance on imported energy, particularly oil. Most countries have encouraged conservation, substitution, increased indigenous production and diversification of import sources, although policy emphasis among the major governments has varied. West Germany has relied on a free market to spur

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conservation. France has pushed conservation and development of nuclear power and the UK has emphasized development of indigenous supplies. []

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Oil. Most West European governments have concentrated on measures to reduce dependence on imported oil and have instituted compulsory oil stock regulations to cope with supply disruptions. The EC Commission, for example, requires each member country to maintain onshore stocks of oil products equivalent to 90 days of last year's inland oil consumption. In the UK and France, the oil industry has to meet virtually the entire compulsory stock requirement. Public companies have been established in West Germany and the Netherlands to hold part of compulsory stocks. Based on industry analysis, we estimate compulsory stocks in excess of minimum operating levels in Western Europe are equal to roughly 41 to 55 mtoe. The West Germans have also established a government-owned stockpile containing about 8 mtoe. []

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Some measures governments have considered or implemented to cope with disruptions include:

- o relaxation of oil price controls--in part to assure a fair supply of oil during an emergency,
- o contingency plans to allocate or ration petroleum products during major disruptions, and
- o use of the IEA and EC sharing plan. []

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Gas. In response to the large and increasing share of gas imports in total gas consumption, some European countries have also begun to implement policies designed to minimize the impact of an interruption in gas supplies. These measures include diversification of supply sources, conservation of indigenous gas resources, increased storage of natural gas, increasing the number of interruptible contracts, and reliance on the Netherlands for increased supplies during an emergency.

- o In West Germany, most new industrial gas customers are now offered only interruptible contracts. Recent estimates indicate that from 20 to 25 percent of German industry has the capability to switch from natural gas to alternative fuels--primarily oil. In the event of a supply disruption, gas utilities would require customers with dual-fired capability to switch to alternate sources of energy. We estimate this could amount to roughly 6 mtoe annually by 1990.
- o Current French government plans call for doubling storage capacity to 9 mtoe by 1990, about one-half dedicated to meet peak winter requirements. Gaz de France intends to increase the amount of gas it sells under interruptible contracts from 15 percent of

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current sales to 20 percent in 1990 or about 5 mtoe annually.

- o Italy plans to increase gas imports in this decade and shut in about 4-5 mtoe of domestic production for use in an emergency. Storage capacity is expected to approach 6.5 mtoe in 1990 but about half of this is committed to meet seasonal needs.

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Risks of Disruptions

Although the odds are against a major internal or external disruption in energy supplies in any particular exporting nation or region, the probability of some sort of disruption occurring is quite high--particularly for oil and natural gas. Since 1950, for example, oil supplies from major exporting countries have been interrupted on 13 occasions. Since a large proportion of the oil used by Western Europe will continue to be imported, the risks associated with a disruption will remain high.

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Increased dependence on natural gas imports from a few countries also raises the potential cost of a gas supply disruption. Western Europe will be importing substantial volumes of natural gas from three potentially insecure sources, the USSR, Algeria, and Libya. Natural gas is less flexible than oil because transmission systems are fixed and supplies are limited. While the international community has limited experience in dealing with gas disruptions, Soviet gas supplies have been disrupted on several occasions in the past during the peak winter demand period because of technical problems and Moscow's own pressing needs for domestic consumption. In the event of a future cutoff, consumers are unlikely to know, at least initially, either the size or duration of a disruption and these uncertainties could lead to severe pressures to take actions.

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Specific conditions prevailing at the onset of an oil or gas supply disruption--such as the level of commercial and strategic stocks, position in the business cycle, the level of international cooperation and political leadership abilities--can also have an important impact on the nature of the market reaction. Perceptions regarding the uncertainties which will probably surround most disruptions along with the specific environment in which the disruption takes place have the potential to turn even seemingly minor problems into major crises.

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Oil Disruptions

Based on our survey of recent market forecasts, the gradual erosion of excess productive capacity later in this decade will leave the oil market increasingly vulnerable to supply cutoffs around 1990 and beyond. The oil industry believes a 2-3 million b/d of surplus capacity is needed to keep the oil market

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stable. Although stocks will play a role in mitigating impacts, the cushion of surplus commercial stocks will likely be far below current levels by 1990. In addition, consuming countries have shown a reluctance to drawdown compulsory or strategic stocks during an interruption. Even so, the potential for a drawdown in these stocks could have a dampening effect on prices. We have examined three possible oil disruptions in 1990, each lasting six months and under forecasted market conditions.

- Class I A 13 million b/d loss in productive capacity. For example, a supply cutoff from the Middle East.
- Class II A 5 million b/d loss in capacity associated with an event such as a major war in the Persian Gulf area.
- Class III A 2 million b/d loss in capacity in a single country or in several countries for technical or political reasons. [redacted]

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Economic Impacts of Oil Supply Disruptions

Previous oil supply disruptions in 1973 and 1979 caused major economic impacts. Oil prices rose sharply and in the months following the disruption there was a noticeable increase in inflation, a slowdown in economic growth and a rise in unemployment. The precise economic impacts of future supply disruptions are difficult to gauge because of structural changes that have occurred in the relationship between energy use and economic growth and the inability to estimate psychological impacts such as consumer stockbuilding behavior. We have attempted to measure the order of magnitude of economic impacts from a supply disruption [redacted]

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[redacted] Based on the mid-range of projected supply/demand levels for 1990, a net oil shortfall was calculated for each of the three hypothetical disruptions. The CIA model was then used to measure the impact on price, GNP, and energy demand. The result of the simulations for the first year effect on Western Europe compared against a base case (no disruption) are as follows (Table 9).

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- Class I GNP loss amounts to 3.8 percentage points and oil prices rise 52 percent above the base case level.
- Class II GNP is reduced by 1.4 percentage points and oil prices rise 18 percent above the base case level.
- Class III GNP is reduced by 0.6 percentage points and oil prices rise 7 percent above the base case level. (C)

Table 9

Disruptions: Effect on Crude Oil Price in 1990

(percentage increase from base case)

<u>Oil</u>			<u>Oil and Gas</u>	
<u>Class I</u>	<u>Class 2</u>	<u>Class 3</u>	<u>Middle East Plus Soviet Union</u>	<u>Saudi Arabia Plus Soviet Union</u>
52	18	7	53	46

Effect on GNP in 1990 in Western Europe

(percentage point change in GNP from base case)

-3.8	-1.4	-0.6	-3.9	-2.5
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Gas Supply Disruptions

Based on expected levels of gas consumption and imports, growing dependence on imported gas in the late 1980s could pose problems for Western Europe. A disruption in gas supplies from the Soviet Union or from the Soviet Union and Algeria would sharply reduce gas availability if measures are not taken to limit vulnerability. The Soviets might be inclined to disrupt gas supplies to Western Europe for several reasons.

- o To pressure West European governments to adopt policies more favorable to the Soviet Union.
- o To countervail economic sanctions, including a grain embargo.

By 1990, gas supplies from Algeria and the Soviet Union could supply one-third of overall gas demand in Western Europe, and a much higher percentage in France and Italy. A gas supply disruption in Europe, therefore, is potentially quite serious, particularly in the event that suppliers were to act in concert. [REDACTED]

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The seasonal nature of gas requirements would tend to magnify the potential impact if a disruption occurred in the winter. West European winter gas consumption in 1981, for example, averaged about 720 million cubic meters per day (215 mtoe annually) while summer requirements declined to about 360 million cubic meters per day (107 mtoe annually). Because most of the growth in gas use is expected in the residential sector, fluctuation in seasonal demand will likely be even more pronounced in the future. [REDACTED]

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West German imports of gas from the Soviet Union are contracted to be as much as 17-18 mtoe or about 36 percent of projected gas supplies in 1990. French imports could be 9-10 mtoe or about 32 percent of gas needs and Italy will probably rely on Soviet supplies for 9-10 mtoe or 36 percent of requirements. The Soviet Union and Algeria together could be providing almost 70 percent of total Italian gas supplies and almost 60 percent of French requirements by 2000. Although a combined Soviet-Algerian disruption is unlikely, we believe joint action cannot be ruled out. In a more likely case, a major interruption from one supplier would result in higher prices but continued supplies from the unaffected country. [REDACTED]

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We have examined a gas supply disruption during the winter of six month duration. To assess the impact, we estimated the following possible supply offsets to determine the vulnerability of the key individual countries.

- o the level of potential surge capacity from excess indigenous production,

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- o the volume of gas available from cutting off interruptible contracts,
- o surge capacity from the Netherlands, and
- o stock draws from gas storage. []

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The amount of supply offsets were estimated based on government plans and/or industry projections. In the case of additional supplies from the Netherlands, we have assumed export capacity is approximately equal to deliveries during the winter of 1979-1980 when Dutch production and exports peaked at 223 million cubic meters/day (see Figure 6). []

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Our analysis indicates that Italy would have a more difficult time than France and West Germany in coping with a loss in Soviet and Algerian gas supplies in 1990. Italy's flexibility is limited mainly by the lack of opportunity to increase Dutch imports during a disruption. Italian imports of Dutch gas are already scheduled to approximate peak levels in 1990. Even France and West Germany would require a cutback in supplies to some customers and sharp inventory drawdowns. Both would also have to rely on incremental Dutch production to offset interrupted supplies. Because precise engineering data on the gas transmission system is not available, it is uncertain whether sufficient capacity exists to deliver the extra volumes of Dutch gas to all affected customers. Indeed, a study by the Rand Corporation indicates that France could have problems drawing on Dutch supplies because of physical limitations in the grid. []

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A total cutoff of Soviet gas in the winter could amount to about 150 million cubic meters per day, about one-sixth of anticipated winter demand in 1990. Possible estimated supply offsets include: []

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- o Increased indigenous production of 49 million cubic meters per day mainly from West Germany and Italy.
- o An additional 150 million cubic meters per day of surge production from the Netherlands.
- o Cutting off customers with interruptible contracts which could equal about 80 million cubic meters per day.
- o Drawdown of surplus inventories of 52 million cubic meters per day mainly from Italy and France. []

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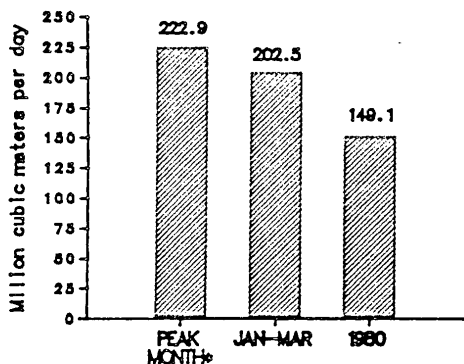
On balance the available offsets appear adequate to offset a Soviet gas disruption in 1990. This does not preclude, however, some upward pressure on energy prices. Fuel switching could add upward pressure on oil prices and because of the linkage between oil and gas prices, the latter could increase as well. Energy

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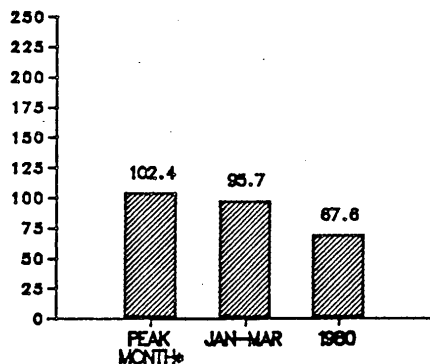
FIGURE: 6

WESTERN EUROPE: GAS FLOWS FROM THE NETHERLANDS, 1980

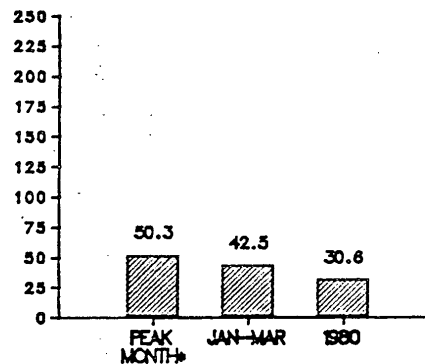
WESTERN EUROPE



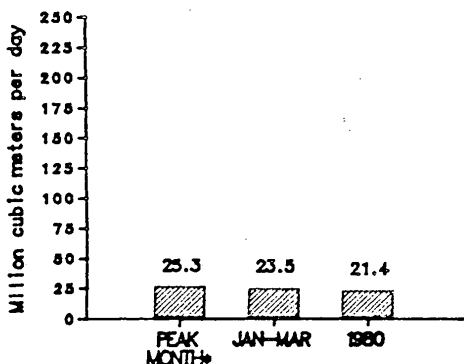
WEST GERMANY



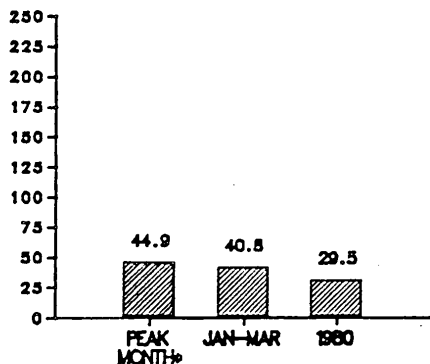
FRANCE



ITALY



BELGIUM-LUXEMBOURG



*The peak month is January for a countries except France - November

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prices in and of themselves might be bid up because of the uncertainties regarding the length of a disruption. [REDACTED]

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Simultaneous Oil and Natural Gas Disruptions

A simultaneous energy supply disruption involving oil and natural gas would pose very serious problem for Western Europe, particularly in the 1990s. We have examined two possible scenarios (see Table 9):

- o a cutoff of Middle East oil and Soviet gas supplies, and
- o a cutoff of oil supplies from Saudi Arabia and Soviet supplies. [REDACTED]

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The impact of either disruption in 1990 on Western Europe would be severe. In the first scenario Western Europe would be deprived of about 15 percent of total energy supplies in 1990 and in the second scenario, total West European energy supplies would be reduced by about 10 percent. [REDACTED]

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[REDACTED] oil prices would rise by more than 50 percent and the GNP loss in Western Europe would amount to about 4 percentage points under the first case. These results, however, understate the impact because the model is able to capture the impact of lost gas supplies only to the extent that gas users are able to convert to oil. [REDACTED]

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A dual-fuel supply disruption, particularly in the winter, would eliminate most of Western Europe's contingency plans for coping with a supply cutoff since the bulk of fuel switching capability in industry is between oil and gas. In addition to a likely sharp runup in energy prices, availability would be severely limited, especially in the residential sector. According to one study, oil and gas combined will supply about two-thirds of energy consumption in the residential sector in Western Europe by 1990 and 75 percent by 2000 (Figures 7-10). Residential sector dependence could approach 80 percent for Italy. [REDACTED]

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Future Policy Options

Decisions made in the next few years will determine Western Europe's dependence on imported energy to the end of the century. Measures already taken probably will reduce oil's role in total energy consumption but Europe will continue to rely heavily on oil imports from the Middle East. Although probably little can be done about substantially increasing indigenous oil production, European countries can to the extent possible diversify supplies away from the Middle East. European countries will have to import increasing amounts of natural gas over the balance of the century. Unless indigenous supplies are developed in the Netherlands and Norway, European dependence on Soviet and Algerian gas supplies could exceed 50 percent by 2000.

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Figure 7

WESTERN EUROPE: ENERGY CONSUMPTION BY SECTOR, 1990

Percent

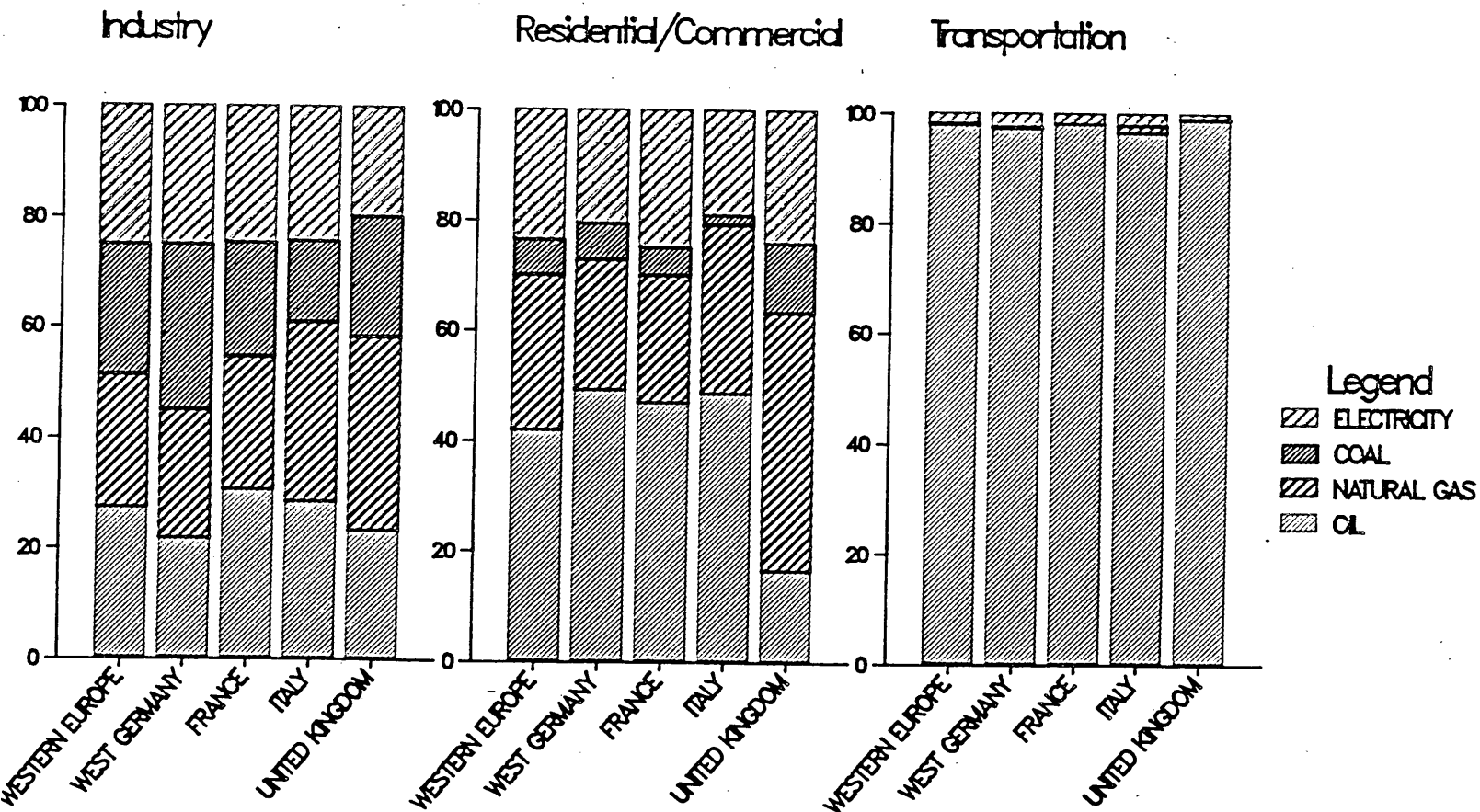


Figure 8

WESTERN EUROPE: ENERGY CONSUMPTION BY SECTOR, 2000 Percent

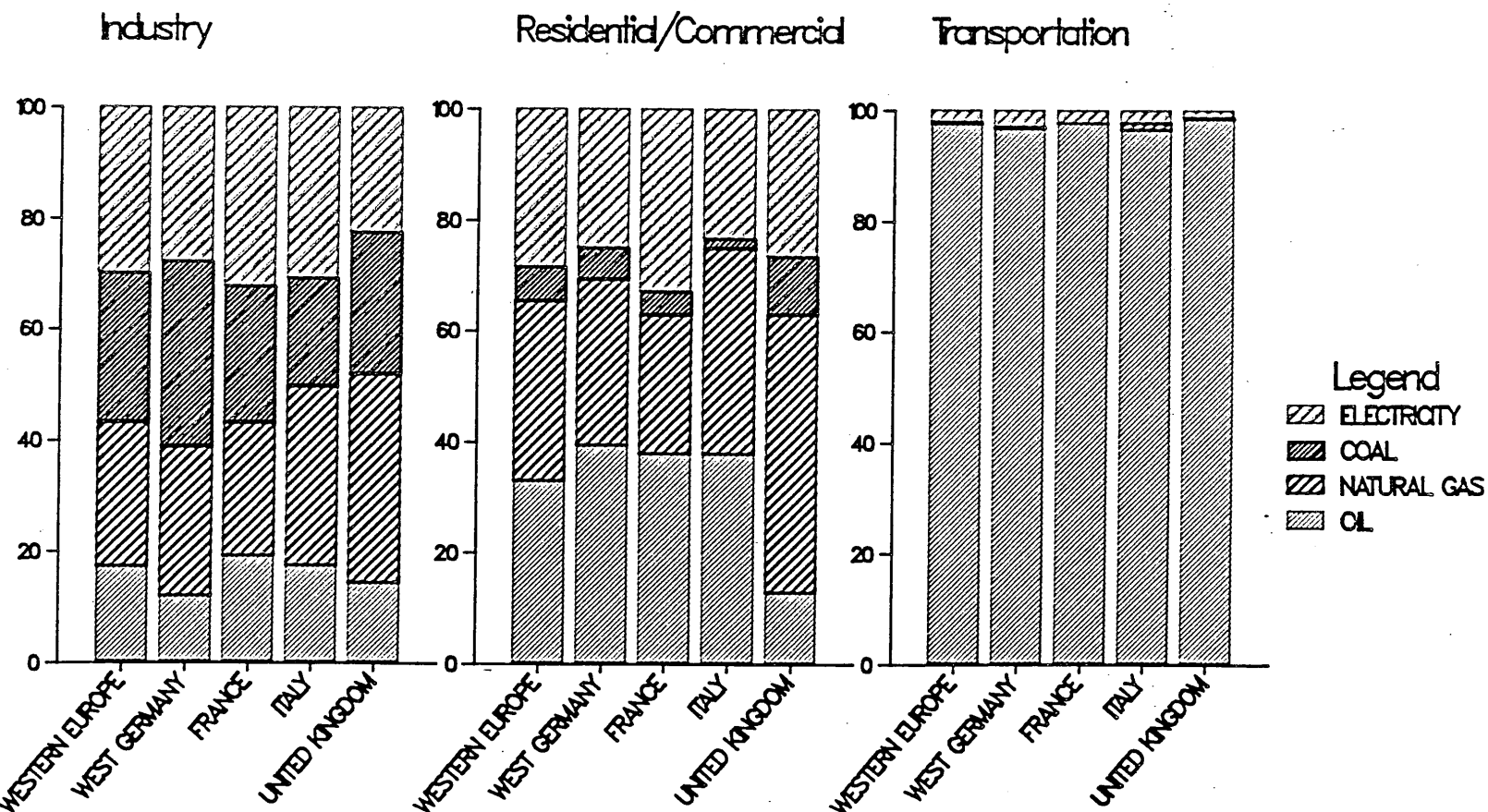


Figure 9

WESTERN EUROPE: ELECTRICITY GENERATION, 1990

Percent

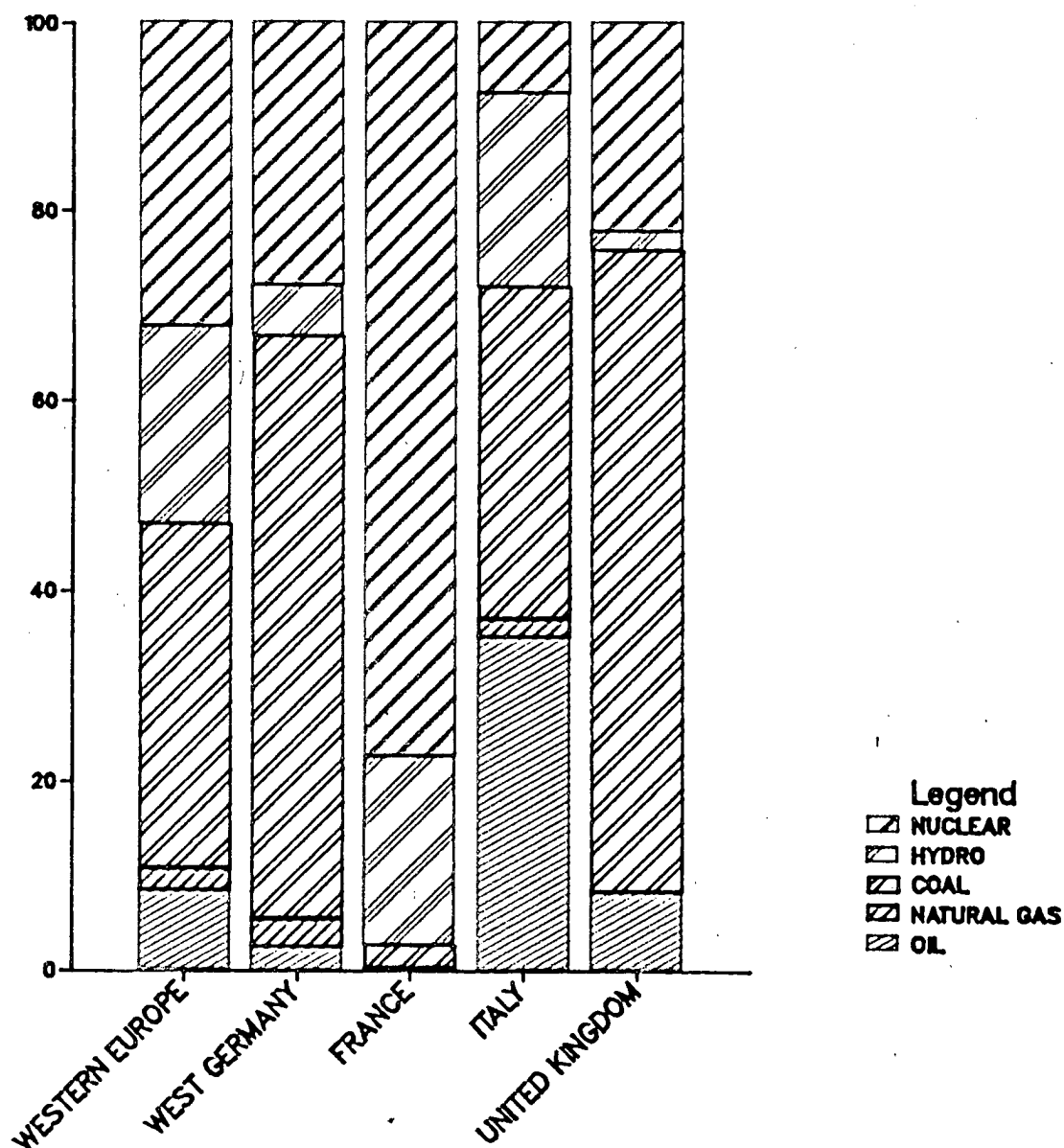
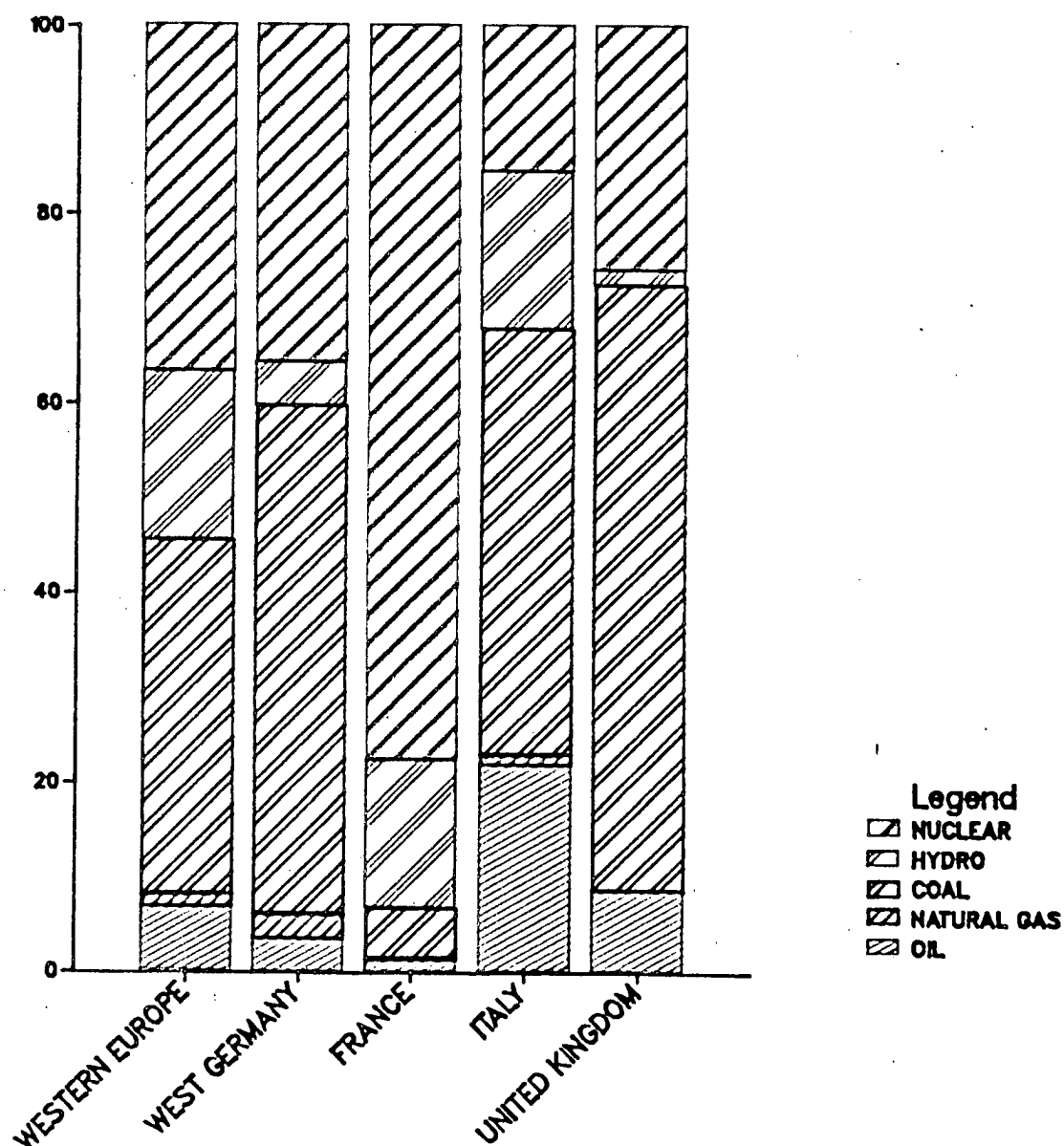


Figure 10

WESTERN EUROPE: ELECTRICITY GENERATION, 2000

Percent



- o Given the high cost of developing Norwegian gas fields and the present weak market, we believe it is extremely doubtful that projects would be undertaken on economic considerations alone. Indeed, present market conditions will require a political commitment by Europeans to ensure timely development.
- o The Netherlands could play a key role in minimizing non-OECD gas imports in the early to mid-1990s if they are willing to extend export contracts. West European purchasers probably will have to show their willingness to maintain Dutch supplies by paying higher prices.
- o The Dutch might also be persuaded to sell more gas with a commitment from Norway to replace these supplies in later years. Such an arrangement would have to prove commercially attractive to the Dutch, however, before it would be attempted.
- o The Dutch could also add to European energy security in the late 1990s and beyond by maintaining strategic gas reserves. Commitments between individual countries and the Netherlands will need to be clearly defined, however, and the Netherlands will probably demand a premium price to maintain this capacity. 25X1

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Next 15 Page(s) In Document Denied